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EXAMINER	
NG, JAMES WAI HEUNG	

ART UNIT	PAPER NUMBER
1763	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/511,883	Applicant(s) PARK ET AL.	
	Examiner James Ng	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☒ Claim(s) *13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 October 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 13 is objected to because of the following informalities: The claim begins with "The method of claim 13," which is incorrect. For examination, this portion is assumed to be "The method of claim 11..." Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 3, 6, 8, 10, 11 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claims 1, 6, 8, 10, 11 and 13 recite the limitation "reactant chamber." There is insufficient antecedent basis for this limitation in the claims. For purpose of examination, the limitation "reactant chamber " is assumed to be "reaction chamber." The Specification also uses the two terms interchangeably. Correction is required.

5. Claim 1 recites the limitation "the first reactant transfer line" in the last line. There is insufficient antecedent basis for this limitation in the claim. For purpose of examination, the limitation is assumed to be "the first reactive gas transfer line."

6. Claim 3 recites the limitation "the inert gas." in lines 3 and 4. There is insufficient antecedent basis for this limitation in the claim.

7. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim

term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "luffing valve" in claims 6, 8 and 11 is used by the claim to mean some type of open/close valve, while the accepted meaning of luffing is related to "turning a boat into the wind[1]." The term is indefinite because the specification does not clearly redefine the term.

8. Claims 6, 8 and 11 recites the limitations "the first path conversion unit" and the "second path conversion unit." There is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-3 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US 6231672 B1) in view of Kim et al. (US 6656282 B2).

Choi teaches a thin film deposition apparatus comprising:

i. A reaction chamber (200) in which wafers (not shown, see Title) are loaded; an exhaust line (from reactor 200 to pump 310) for exhausting gas from the reaction chamber (200); a first reactive gas supply unit (1110) for selectively supplying a first reactive gas to the reaction chamber (200) or the exhaust line (from reactor 200 to pump 310); a first

reactive gas transfer line (21) for connecting the first reactive gas supply unit (1110) and the reaction chamber (200); a first bypass line (71) for connecting the first reactive gas supply line (11) and the exhaust line (from reactor 200 to pump 310); and a main purge gas supply unit (1130) for supplying a main purge gas to the first reactive gas transfer line (21) (Fig. 2, Col. 3, lines 1-67) – **in claim 1**. Choi further teaches a second reactive gas supply unit (1120) for selectively supplying a second reactive gas to the reaction chamber (200) via a second reactive gas transfer line (22), or to the exhaust line (from reactor 200 to pump 310); a second bypass line (72) for connecting the second reactive gas supply unit (1120) and the exhaust line (from reactor 200 to pump 310); and a main purge gas supply unit (1130) for supplying a main purge gas to the second reactive gas transfer line (22) (Fig. 2, Col. 3, lines 1-67).

ii. The first reactive gas supply unit (1110) comprises: a source container (116) filled with a predetermined amount of liquid first reactant which will be the first reactive gas; an MFC 1 (on line 11, prior to 116) for controlling the flow rate of an inert gas fed into the source container (116); and a first path conversion unit (section between and including valves 112, 113, 114 and 115) for enabling the inert gas or the first reactive gas to selectively flow into the first reactive gas transfer line (21) or the first bypass line (71) (Fig. 2, Col. 3, lines 14-32) – **claim 2**.

iii. An MFC 3 (MFC on gas line 12) for controlling the flow rate of an inert gas (Fig. 2, Col. 3, lines 14-44) – **in claim 3**. Choi further teaches a second path conversion unit (section between and including valves 122, 123, 124 and 125) for enabling the second reactive gas

to selectively flow into the second reactive gas transfer line (22) and/or the second bypass line (72) (Fig. 2, Col. 3, lines 14-44).

iv. The main purge gas supply unit (1130) comprises: an MFC 4 (MFC after purge gas supply 136) for controlling the flow rate of the main purge gas; and a third path conversion unit (section from and including valve 133 to 134) for enabling the main purge gas to flow [continuously] into the first reactive gas transfer line (21) or [the second reactive gas transfer line (22)] (Fig. 2, Col. 3, lines 45-67) – **in claim 5**.

v. A method for using the deposition apparatus of claims 1, the method comprising: forming a thin film (Col. 1, line 8) on a substrate (wafer, Col. 1, line 8) loaded in the reaction chamber (200) by performing a first reactive gas feeding step (Col. 4, lines 15-32) in which the first reactive gas is fed into the reaction chamber (200) and a first reactive gas purge step (Col. 4, lines 33-38) in which the first reactive gas, fed into the reaction chamber (200), is purged, in a state where a luffing valve (on/off valve before pump 310 in exhaust line) positioned between the reaction chamber (200) and the exhaust line (from reactor 200 to pump 310) remains open, gases flowing through an inner point A (point between valves 112, 113, 114 and 115) of the first path conversion unit and an inner point B (point between valves 122, 123, 124 and 125) of the second path conversion unit continue to flow into the reaction chamber (200) or bypass lines (71, 72) (Fig. 2, Col. 4, lines 15-38; Col. 5, lines 9-28) – **in claim 6.**

vi. A method of using the deposition apparatus of claim 1, the method comprising: forming a thin film (Col. 1, line 8) on a substrate (wafer, Col. 1, line 8) loaded in a reaction chamber (200) by a first reactive gas feeding step in which the first reactive gas is fed

into the reactant chamber, and a first reactive gas purge step in which the first reactive gas, fed into the reactant chamber, is purged, in a state where a luffing valve (on/off valve before pump 310 in exhaust line) positioned between the reaction chamber (200) and the exhaust line (from reactor 200 to pump 310) remains open, and gases flowing through an inner point A (point between valves 112, 113, 114 and 115) of the first path conversion unit (section between and including valves 112, 113, 114 and 115), an inner point B (point between valves 122, 123, 124 and 125) of the second path conversion unit (section between and including valves 122, 123, 124 and 125), and an inner point C (point between valves 133 and 134) of the third path conversion unit (section from and including valve 133 to 134) continue to flow into the reaction chamber (200) or bypass lines (71, 72) (Fig. 2, Col. 4, lines 15-65; Col. 5, lines 9-29) – **in claim 8**.

vii. Regarding claim 9, a method, wherein the sum of the flow rate of the inert gas flowing through the first reactive gas transfer line and the second reactive gas transfer line is maintained at a constant level during the first reactive gas purge step (Col. 5, lines 15-23).

Choi does not teach:

i. A radical supply unit for generating corresponding radicals by applying plasma to a second reactive gas and then selectively supplying the radicals to the reaction chamber or the exhaust line; a radical transfer line for connecting the radical supply unit and the reaction chamber; a second bypass line for connecting the radical supply unit and the exhaust line; and a main purge gas supply unit for supplying a main purge gas to the radical transfer line –**in claim 1**.

ii. The apparatus of claim 1, wherein the radical supply unit comprises: an MFC 2 for controlling the flow rate of the second reactive gas; a remote plasma generator into which the second reactive gas and/or the inert gas are fed by way of the MFC 2 and the MFC 3 and for generating corresponding radicals by applying plasma to the second reactive gas; and a second path conversion unit for enabling the generated radicals to selectively flow into the radical transfer line and/or the second bypass line – **in claim 3**.

iii. The apparatus of claim 1, wherein, a third path conversion unit for enabling the main purge gas to flow into the first reactive gas transfer line or the radical transfer line – **in claim 5**.

iv. An atomic film deposition method using the remote-plasma atomic film deposition apparatus of claims 1, radicals are fed into the reaction chamber – **in claim 6**. Further, Choi does not teach the deposition process is repeated.

v. The method of claim 6, after depositing a thin film, further comprising injecting radicals and an inert gas into the reaction chamber to thermally treat the thin film, wherein the radicals are formed of at least one selected from the group consisting of O, N, H, OH, and NH and a combination thereof – **as claimed in claim 7**.

vi. An atomic film deposition method using the remote-plasma atomic film deposition apparatus of claims 1, the method comprising: a radical feeding step in which radicals are fed into the reaction chamber, a radical purge step in which the radicals are purged from the reaction chamber – **in claim 8.** Further, Choi does not teach the deposition process is repeated.

vii. The method of claim 8, wherein the sum of the flow rate of the inert gas flowing through the first reactive gas transfer line and *the radical transfer line* is maintained at a constant level during the first reactive gas purge step – **as claimed in claim 9**.

viii. The method of claim 8, after depositing a thin film, further comprising injecting radicals and an inert gas into the reaction chamber to thermally treat the thin film, wherein the radicals are formed of at least one selected from the group consisting of O, N, H, OH, and NH and a combination thereof – **as claimed in claim 10**.

Kim teaches a remote plasma substrate processing apparatus comprising:

i. A radical supply unit (from Process Gas to Remote Plasma Generator 7) for generating corresponding radicals by applying plasma to a reactive gas and then supplying the radicals to the reaction chamber ("To Reactor," Fig. 3) (Fig. 3, Col. 4, lines 60-67) – **for claims 1, 3 and 5**.

ii. The radical supply unit (from Process Gas to Remote Plasma Generator 7) comprises: an MFC 2 (MFC2 prior to valve V12) for controlling the flow rate of the second reactive gas; a remote plasma generator (7) into which the second reactive gas is fed by way of the MFC 2 (MFC2 prior to valve V12) and for generating corresponding radicals by applying plasma to the second reactive gas (Fig. 3, Col. 4, lines 60-67) –**in claim 3**.

iii. A third path conversion unit (section from valve V4 to V5) for enabling the main purge gas to flow into the first reactive gas transfer line (from V3 to Reactor) or the radical transfer line (from V7 to Reactor) (Fig. 3, Col. 5, lines 20-30) – **in claim 5**.

iv. A method of using a remote-plasma atomic film deposition apparatus (Fig. 3) where radicals (7, Fig. 3) are fed into the reaction chamber ("To Reactor," Fig. 3) (Fig. 3, Col. 5, lines 60-67) – **in claim 6**, and the deposition process is repeated (Col. 3, lines 5-7). Once Choi's second source container (126, Fig. 2) is replaced (see below) by Kim's radical supply unit, Choi's second reactive gas transfer line (22) becomes a radical transfer line, which feeds radicals into the reaction chamber, also Choi's second bypass line (72) is then connected to the radical supply unit.

v. A method of using a remote-plasma atomic film deposition apparatus (Fig. 3), the method comprising: performing a radical feeding step (7, Fig. 3) in which radicals (7, Fig. 3) are fed into the reaction chamber ("To Reactor," Fig. 3), a radical purge step (25, Fig. 3) in which the radicals are purged from the reaction chamber ("To Reactor," Fig. 3), a non-plasma gas (23, Fig. 3) feeding step in which the non-plasma gas (23, Fig. 3) is fed into the reaction chamber ("To Reactor," Fig. 3), and a non-plasma gas purge step (27, Fig. 3) in which the non-plasma gas, fed into the reaction chamber ("To Reactor," Fig. 3) is purged (Col. 3, lines 11-22) – **in claim 8**, and the deposition process is repeated (Col. 3, lines 40-41).

vi. **Regarding claim 9**, once Choi's second source container (126, Fig. 2) is replaced (see below) by Kim's radical supply unit, Choi's second reactive gas transfer line (22) becomes a radical transfer line, which then would allow Choi's apparatus to enable the sum of the flow rate of the inert gas flowing through the first reactive gas transfer line (21) and the radical transfer line to be maintained at a constant level during the first reactive gas purge step (Choi, Col. 5, lines 15-28).

vii. After depositing a thin film (Col. 2, line 13), radicals (7, Fig. 3) and an inert gas (N_2/Ar, Fig. 3) are injected into the reaction chamber ("To Reactor," Fig. 3) to thermally treat the thin film (Col. 2, line 13), wherein the radicals (7, Fig. 3) are formed of at least one selected from the group consisting of O, N, H, OH, and NH and a combination thereof (Fig. 3, Col. 2, lines 34-53) – **claims 7 and 10**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Choi's second source container (126, Fig. 2) with Kim's radical supply unit (from Process Gas to Remote Plasma Generator 7), and to supply the plasma reactor with Kim's group of reactants, and also to replace Choi's continuously flowing third path conversion unit (section from and including valve 133 to 134) with Kim's third path conversion unit (section from valve V4 to V5) (See enclosed Examiner's drawing of Choi's Fig. 2).

It would also have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the use of Choi's apparatus by adding Kim's sequence of film forming steps.

Motivation to replace Choi's second source container with Kim's radical supply unit and to use Kim's group of reactants is to form film with remote plasma, which allows the supply of reactive materials (reaction radicals) at such low temperatures as to deposit oxide, nitride and metal thin films almost free of impurities as taught by Kim (Col. 2, lines 9-15 and 34-53).

Motivation to replace Choi's continuously flowing third path conversion unit with Kim's third path conversion unit is for selectively purging the first reactive gas transfer line or the radical transfer line as taught by Kim (Col. 5, lines 20-30).

Motivation to optimize the use of Choi's apparatus by adding Kim's sequence of film forming steps is to deposit films almost free of impurities as taught by Kim (Col. 6, lines 58-67). Further, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 1056 (Fed. Cir. 1990), MPEP 2144.05).

11. Claims 4, 11, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US 6231672 B1) in view of Kim et al. (US 6656282 B2) as applied to claims 3 and 1 above, and further in view of Xia et al. (US 6258735). Choi and Kim are discussed above.

Choi further teaches:

i. A method for using a deposition apparatus (Fig. 2), the method comprising: forming a thin film (Col. 1, line 8) on a substrate (wafer, Col. 1, line 8) loaded in the reaction chamber (200) where a first reactive gas feeding step in which the first reactive gas is fed into the reaction chamber (200), and a first reactive gas purge step in which the first reactive gas is purged from the reactant chamber (200), in a state where a luffing valve (on/off valve before pump 310 in exhaust line) positioned between the reaction chamber (200) and the exhaust line remains open and gases flowing through an inner point A (point between valves 112, 113, 114 and 115) of the first path conversion unit (section between and including valves 112, 113, 114 and 115) continue to flow into the reaction

chamber (200) or bypass line (71) (Fig. 2, Col. 4, lines 15-65; Col. 5, lines 9-28) – **in claim 11**. Choi further teaches a second reactive gas feeding step in which the second reactive gas is fed into the reaction chamber (200), a second reactive gas purge step in which the second reactive gas is purged from the reaction chamber (200).

Choi does not teach:

i. An atomic film deposition method using the remote-plasma atomic film deposition apparatus of claims 1, the method comprising: forming a thin film on a substrate loaded in the reaction chamber by repeatedly performing a radical feeding step in which radicals are fed into the reaction chamber, a radical purge step in which the radicals are purged from the reaction chamber, wherein the radical purge step comprises injecting only the inert gas (excluding the second reactive gas), the flow rate of which is controlled by the MFC 3 of the radical supply unit, into the reaction chamber by way of the radical transfer line - **in claim 11**.

ii. The method of claim 11, wherein the sum of the flow rate of the inert gas flowing through the first reactive gas transfer line and the second reactive gas transfer line is maintained at a constant level during the first reactive gas purge step – **claim 12**.

iii. The method of claim 11, after depositing a thin film, further comprising injecting radicals and an inert gas into the reaction chamber to thermally treat the thin film, wherein the radicals are formed of at least one selected from the group consisting of O, N, H, OH, and NH and a combination thereof – **as claimed in claim 13**.

Kim further teaches:

i. An atomic film deposition method using a remote-plasma atomic film deposition apparatus (Fig. 3), the method comprising: performing a radical feeding step (7, Fig. 3) in which radicals are fed into the reaction chamber ("To Reactor," Fig. 3), a radical purge step (27, Fig. 3) in which the radicals are purged from the reaction chamber, a non-plasma reactive gas feeding step (23, 27, Fig. 3) in which the non-plasma reactive gas is fed into the reaction chamber ("To Reactor," Fig. 3), and a non-plasma reactive gas purge step in which the first reactive gas is purged from the reaction chamber ("To Reactor," Fig. 3) (Col. 3, lines 11-22) – **in claim 11**, and the deposition process is repeated (Col. 3, lines 40-41).

ii. **Regarding claim 12**, as discussed in claim 9 above, once Choi's second source container (126, Fig. 2) is replaced (see below) by Kim's radical supply unit, Choi's second reactive gas transfer line (22) becomes a radical transfer line, which then would allow Choi's apparatus to enable the sum of the flow rate of the inert gas flowing through the first reactive gas transfer line (21) and the radical transfer line to be maintained at a constant level during the first reactive gas purge step (Col. 5, lines 15-28).

iii. After depositing a thin film, radicals and an inert gas are injected into the reaction chamber ("To Reactor," Fig. 3)) to thermally treat the thin film, wherein the radicals are formed of at least one selected from the group consisting of O, N, H, OH, and NH and a combination thereof (Fig. 3, Col. 2, lines 34-53) – **claim 13**.

Choi and Kim do not teach:

i. The apparatus of claim 3, wherein the radical supply unit further comprises a third bypass line for enabling the second reactive gas to selectively flow through the MFC 2 into the second bypass line – **as claimed in claim 4**.

ii. An atomic film deposition method using the remote-plasma atomic film deposition apparatus of claims 1, the method comprising: while a first reactive gas is purged from the reaction chamber, gases flowing through an inner point D of the radical supply unit continue to flow into the reaction chamber or bypass line – **in claim 11**.

Xia teaches a plasma deposition apparatus comprising:

i. A bypass line (42) with a valve (40) for enabling a second reactive gas to selectively flow to the plasma generator (11) or to the chamber exhaust line (line from exhaust manifold 24 to pump 32) (Fig. 1, lines 6-45) – **in claims 4 and 11**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Xia's bypass line with valve to Kim's radical supply unit at a location, which we will use as point D of claim 11, between Kim's MFC2 and valve V12 (See enclosed Examiner's drawing of Choi's Fig. 2), and further to optimize the use of Choi's Kim-and-Xia-modified apparatus by adding Kim's sequence of film forming steps.

Motivation to add Xia's bypass line with valve to Kim's radical supply unit at a location between Kim's MFC2 and valve V12 is for the second reactive gas to circumvent the plasma generator allowing the reactive gas to stabilize prior to routing the gas to the plasma generator as taught by Kim (Col. 4, lines 23-30).

Motivation to optimize the use of Choi's Kim-and-Xia-modified apparatus by adding Kim's sequence of film forming steps is for low temperature oxide, nitride and metal film deposition that's almost free of impurities as taught by Kim (Col. 2, lines 8-14, Col. 6, lines 60-67). Further, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

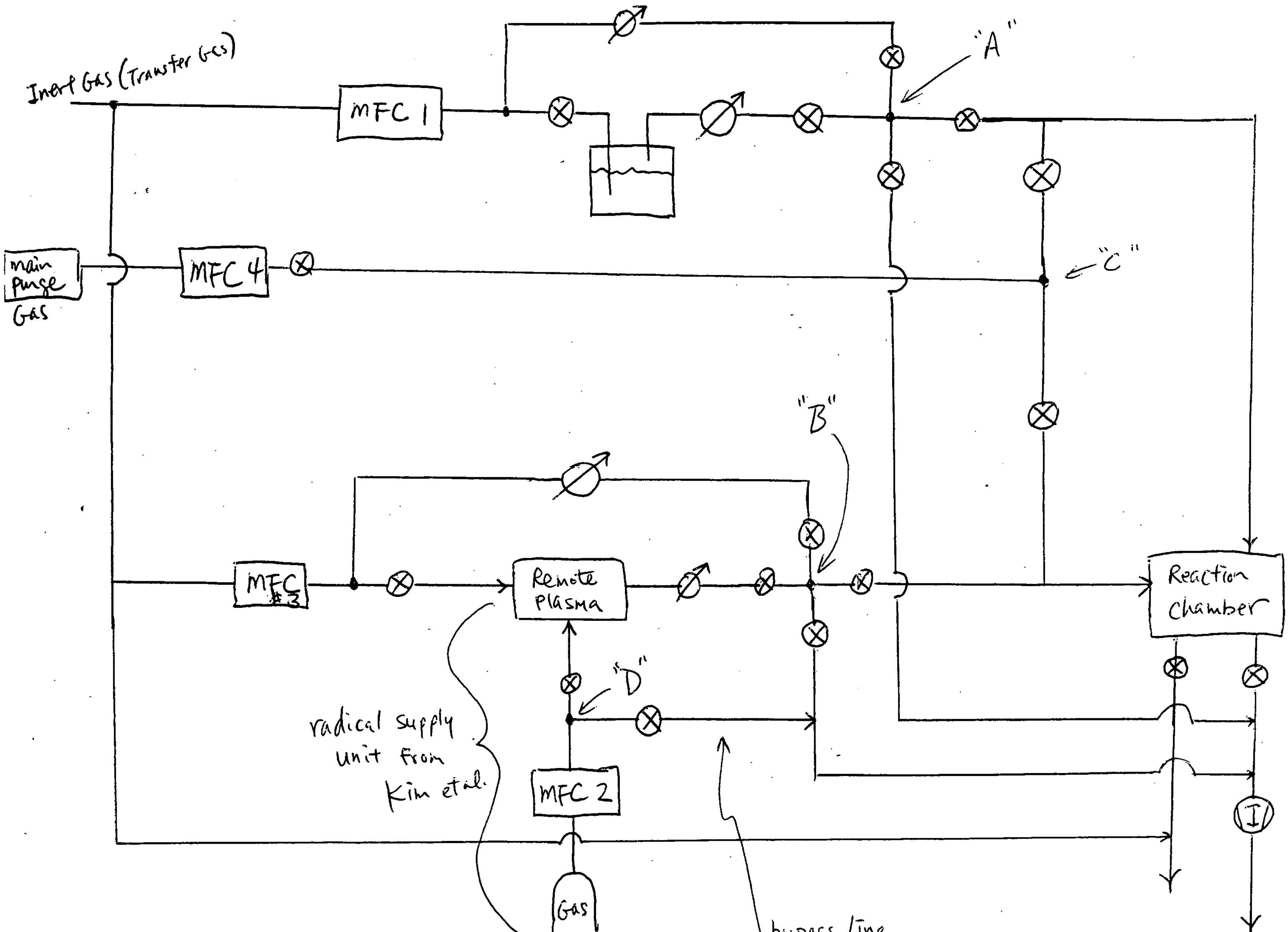
Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner James Ng whose telephone number is (571) 272-7088. The examiner can normally be reached on a Monday through Thursday schedule from 9am through 4:30pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner cannot be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

James Ng
Patent Examiner
Art Unit 1763

4/2/6
Rudy Zervigon
Primary Patent Examiner
Art Unit 1763

[1] http://www.m-w.com/dictionary/luffing



Examiner's Drawing of Choi's Fig. 2